PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Kazufumi OGAWA

Serial No.: New Application

Filed: August 10, 2001

For: ORGANIC ELECTRONIC DEVICE, METHOD OF PRODUCING THE SAME, AND METHOD OF OPERATING THE SAME

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified application, please enter the following specification changes as noted below:

IN THE CLAIMS:

Please amend claims 16-18, 23, 24, 36, 80-96 and 101 as follows:

16. (Amended) A method of producing an organic electronic device according to claim 14, wherein the organic thin film is a monomolecular film or a monomolecular built-up film, the monomolecular film and the monomolecular built-up film being fixed to the substrate.

17. (Amended) A method of producing an organic electronic device according to claim 14, wherein chemisorption or the Langmuir-Blodgett technique is utilized in the step of forming an organic thin film.

18. (Amended) A method of producing an organic electronic device according to claim 14, wherein in the step of forming a conductive network, the bonding of the organic molecules making up the organic thin film to one another by conjugated bonds to form a conductive network is achieved by polymerization or polymerization followed by crosslinking.

23. (Amended) A method of producing an organic electronic device according to claim 14, wherein the polymerizable group is selected from the group consisting of a catalytically polymerizable group, an electrolytically polymerizable group, and a polymerizable group that is polymerized through energy beam irradiation.

24. (Amended) A method of producing an organic electronic device according to claim 14, wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming a first electrode and a second electrode is carried out before the step of forming a conductive network; and

the step of forming a conductive network comprises applying a voltage between the first electrode arid the second electrode so that the electrolytically polymerizable group of each organic molecule of the organic molecular group undergoes an electrolytic-polymerization reaction to form a conductive network.

36. (Amended) A method of operating an organic electronic device according to claim 29, wherein the conductive organic thin film is a monomolecular film or a monomolecular built-up film, the monomolecular organic molecules is fixed to the specified portion of the surface of the substrate by covalent bonds;

forming the conductive network by bonding the organic molecules making up the organic molecular group to one another by conjugated bonds, and

forming the first electrode and the second electrode on the substrate.

80. (Amended) A method of producing an organic electronic device according to claim 76, wherein the substrate is such that active hydrogens are not exposed on the surface.

81. (Amended) A method of producing an organic electronic device according to claim 76, wherein the active hydrogen exposure treatment is such that the specified portion of the surface of the substrate is oxidized and supplied with active hydrogens.

82. (Amended) A method of producing an organic electronic device according to claim 76, wherein the substrate is a layered substrate wherein a water-repellent organic film is formed on a surface of a substrate material having active hydrogens exposed thereon, and the active hydrogen exposure treatment is such that the specified portion of the surface of the layered substrate is oxidized to remove the water-repellent organic film, whereby active hydrogens are exposed.

83. (Amended) A method of producing an organic electronic device according to claim 78, wherein the substrate is such that active hydrogens are exposed on the surface.

84. (Amended) A method of producing an organic electronic device according to claim 78, wherein the active hydrogen removing treatment is a chemical treatment performed to remove active hydrogens from the portion other than the specified portion of the surface of the substrate.

85. (Amended) A method of producing an organic electronic device according to claim 78, wherein the active hydrogen removing treatment is a physical treatment performed to remove active hydrogens from the portion other than the specified portion of the surface of the substrate.

86. (Amended) A method of producing an organic electronic device according to claim 76, wherein the conductive organic thin film is a monomolecular film or a monomolecular built-up film, the monomolecular film and the monomolecular built-up film being fixed to the substrate.

87. (Amended) A method of producing an organic electronic device according to claim 76, wherein chemisorption or the Langmuir-Blodgett technique is utilized in the step of forming a film.

88. (Amended) A method of producing an organic electronic device according to claim 76, wherein the polymerizable group is selected from the group consisting of a catalytically polymerizable group, an electrolytically polymerizable group, and a polymerizable group that is polymerized through energy beam irradiation.

89. (Amended) A method of producing a two-terminal organic electronic device according claim 76, wherein the light-responsive group is a photoisomerizable group.

90. (Amended) A method of producing a two-terminal organic electronic device according to claim 76, wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network is such that each electrolytically polymerizable group is subjected to an electrolytic-polymerization reaction to form the conductive network.

91. (Amended) A method of producing a two-terminal organic electronic device according to claim 76, wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group; and

the method further comprises, after the step of forming the first electrode and the second electrode, a step of forming a coating film on the organic thin film and an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

92. (Amended) A method of producing a two-terminal organic electronic device according to claim 76, wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network includes forming a coating film on the organic thin film while forming the conductive network of the organic thin film and an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

93. (Amended) A method of producing a three-terminal organic electronic device according to claim 77, wherein the polar group is a polarizable group that is polarized when an electric field is applied.

94. (Amended) A method of producing a three-terminal organic electronic device according to claim 77, wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network is such that by applying a voltage between the first electrode and the second electrode, each electrolytically polymerizable group is subjected to an electrolytic-polymerization reaction to form the conductive network.

95. (Amended) A method of producing a three-terminal organic electronic device according to claim 77, wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group; and

the method further comprises, after the step of forming the first electrode and the second electrode, a step of forming a coating film on the organic thin film and an additional conductive network in the coating film by immersing the substrate having the

organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

96. (Amended) A method of producing a three-terminal organic electronic device according to claim 77, wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network includes forming a coating film on the organic thin film while forming the conductive network of the organic thin film and. an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which

organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

101. (Amended) A method of producing an electroluminescent display device according to claim 98, wherein the fluorescent material comprises three types of fluorescent materials, those which emit red, blue, and green light, respectively, and are formed at specified positions in the step of forming a light-emitting layer to achieve color display.

REMARKS

Claims 1-101 remain pending herein. Claims 16-18, 23, 24, 36, 80-96 and 101 have been amended hereby.

This Preliminary Amendment is submitted to eliminate multiply dependent claims from the above-identified application.

Examination of this application on its merits is respectfully requested.

Respectfully submitted,

PARKHURST & WENDEL, L.L.P.

August 10, 2001
Date

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Attachment: Version with Markings
to Show Changes Made

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16. (Amended) A method of producing an organic electronic device according to claim 14 [claims 14 or 15], wherein the organic thin film is a monomolecular film or a monomolecular built-up film, the monomolecular film and the monomolecular built-up film being fixed to the substrate.

17. (Amended) A method of producing an organic electronic device according to claim 14 [claims 14 or 15], wherein chemisorption or the Langmuir-Blodgett technique is utilized in the step of forming an organic thin film.

18. (Amended) A method of producing an organic electronic device according to claim 14 [claims 14 or 15], wherein in the step of forming a conductive network, the bonding of the organic molecules making up the organic thin film to one another by conjugated bonds to form a conductive network is achieved by polymerization or polymerization followed by crosslinking.

23. (Amended) A method of producing an organic electronic device according to claim 14 [claims 14 or 15], wherein the polymerizable group is selected from the group consisting of a

catalytically polymerizable group, an electrolytically polymerizable group, and a polymerizable group that is polymerized through energy beam irradiation.

24. (Amended) A method of producing an organic electronic device according to claim 14 [claims 14 or 15], wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming a first electrode and a second electrode is carried out before the step of forming a conductive network; and

the step of forming a conductive network comprises applying a voltage between the first electrode arid the second electrode so that the electrolytically polymerizable group of each organic molecule of the organic molecular group undergoes an electrolytic-polymerization reaction to form a conductive network.

36. (Amended) A method of operating an organic electronic device according to claim 29 [claims 29 or 30], wherein the conductive organic thin film is a monomolecular film or a monomolecular built-up film, the monomolecular organic molecules is fixed to the specified portion of the surface of the substrate by covalent bonds;

forming the conductive network by bonding the organic molecules making up the organic molecular group to one another by conjugated bonds, and

forming the first electrode and the second electrode on the substrate.

80. (Amended) A method of producing an organic electronic device according to claim 76 [claims 76 or 77], wherein the substrate is such that active hydrogens are not exposed on the surface.

81. (Amended) A method of producing an organic electronic device according to claim 76 [claims 76 or 77], wherein the active hydrogen exposure treatment is such that the specified portion of the surface of the substrate is oxidized and supplied with active hydrogens.

82. (Amended) A method of producing an organic electronic device according to claim 76 [claims 76 and 77], wherein the substrate is a layered substrate wherein a water-repellent organic film is formed on a surface of a substrate material having active hydrogens exposed thereon, and the active hydrogen exposure treatment is such that the specified portion of the surface of the

layered substrate is oxidized to remove the water-repellent organic film, whereby active hydrogens are exposed.

83. (Amended) A method of producing an organic electronic device according to claim 78 [claims 78 or 79], wherein the substrate is such that active hydrogens are exposed on the surface.

84. (Amended) A method of producing an organic electronic device according to claim 78 [claims 78 or 79], wherein the active hydrogen removing treatment is a chemical treatment performed to remove active hydrogens from the portion other than the specified portion of the surface of the substrate.

85. (Amended) A method of producing an organic electronic device according to claim 78 [claims 78 and 79], wherein the active hydrogen removing treatment is a physical treatment performed to remove active hydrogens from the portion other than the specified portion of the surface of the substrate.

86. (Amended) A method of producing an organic electronic device according to claim 76 [any of claims 76 to 79], wherein the conductive organic thin film is a monomolecular film or a

monomolecular built-up film, the monomolecular film and the monomolecular built-up film being fixed to the substrate.

87. (Amended) A method of producing an organic electronic device according to claim 76 [any of claims 76 to 79], wherein chemisorption or the Langmuir-Blodgett technique is utilized in the step of forming a film.

88. (Amended) A method of producing an organic electronic device according to claim 76 [any of claims 76 to 79], wherein the polymerizable group is selected from the group consisting of a catalytically polymerizable group, an electrolytically polymerizable group, and a polymerizable group that is polymerized through energy beam irradiation.

89. (Amended) A method of producing a two-terminal organic electronic device according claim 76 [claims 76 or 78], wherein the light-responsive group is a photoisomerizable group.

90. (Amended) A method of producing a two-terminal organic electronic device according to claim 76 [claims 76 or 78], wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network is such that each electrolytically polymerizable group is subjected to an electrolytic-polymerization reaction to form the conductive network.

91. (Amended) A method of producing a two-terminal organic electronic device according to claim 76 [claims 76 or 78], wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group; and

the method further comprises, after the step of forming the first electrode and the second electrode, a step of forming a coating film on the organic thin film and an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external

electrode being contacted with the organic solvent and disposed above the organic thin film.

92. (Amended) A method of producing a two-terminal organic electronic device according to claim 76 [claims 76 or 78], wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network includes forming a coating film on the organic thin film while forming the conductive network of the organic thin film and an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

93. (Amended) A method of producing a three-terminal organic electronic device according to claim 77 [claims 77 or 79], wherein the polar group is a polarizable group that is polarized when an electric field is applied.

94. (Amended) A method of producing a three-terminal organic electronic device according to claim 77 [claims 77 or 79], wherein:

the polymerizable group is an electrolytically polymerizable group;

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network is such that by applying a voltage between the first electrode and the second electrode, each electrolytically polymerizable group is subjected to an electrolytic-polymerization reaction to form the conductive network.

95. (Amended) A method of producing a three-terminal organic electronic device according to claim 77 [claims 77 or 79], wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group; and

the method further comprises, after the step of forming the first electrode and the second electrode, a step of forming a coating film on the organic thin film and an additional conductive network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

96. (Amended) A method of producing a three-terminal organic electronic device according to claim 77 [claims 77 or 79], wherein:

the polymerizable group is an electrolytically polymerizable group that is a pyrrolyl group or a thienyl group

the step of forming the first electrode and the second electrode is carried out before the step of forming the conductive network; and

the step of forming the conductive network includes forming a coating film on the organic thin film while forming the conductive network of the organic thin film and. an additional conductive

network in the coating film by immersing the substrate having the organic thin film formed thereon in an organic solvent in which organic molecules each having a light-responsive group and a functional group that is a pyrrolyl group or a thienyl group are dissolved and applying voltages between the first electrode and the second electrode and between the first electrode or the second electrode and an external electrode, respectively, the external electrode being contacted with the organic solvent and disposed above the organic thin film.

101. (Amended) A method of producing an electroluminescent display device according to claim 98 [claims 98 or 100], wherein the fluorescent material comprises three types of fluorescent materials, those which emit red, blue, and green light, respectively, and are formed at specified positions in the step of forming a light-emitting layer to achieve color display.